

--	--	--	--	--	--	--	--	--	--



## GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

B. Tech Degree Examinations, June – 2021

(Sixth Semester)

**BEIPC6010 – PROCESS CONTROL**

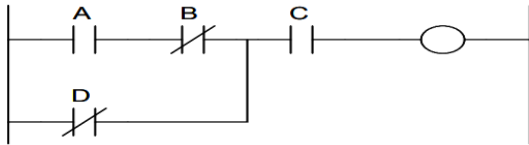
(AEI)

Time: 2 hrs

Maximum: 50 Marks

**Answer ALL Questions****The figures in the right hand margin indicate marks.****PART – A: (Multiple Choice Questions)****(1 x 10 = 10 Marks)**

- Q.1. Answer ALL questions** [CO#] [PO#]
- a. The feedback system in a diaphragm provides an electrical measurement of the pressure through: 1 1
- (i) Digital signal (ii) Pneumatic signal
- (iii) Hydraulic signal (iv) Error signal
- b. the velocity of EM radiation in glass that has an index of refraction of  $n = 1.57$  is \_\_\_\_\_. 1 2
- (i)  $2.11 \times 10^7$  m/s (ii)  $1.91 \times 10^8$  m/s
- (iii)  $1.05 \times 10^8$  m/s (iv)  $1.84 \times 10^7$  m/s
- c. Which physical factor does an indirect level measurement device use to provide a level indication? 1 1
- (i) Hydrostatic Pressure (ii) Conductivity
- (iii) Conductivity (iv) Turbulence
- d. In the internal structure of a MOSFET, a parasitic BJT exists between the 2 1
- (i) source & gate terminals (ii) source & drain terminals
- (iii) drain & gate terminals (iv) there is no parasitic BJT in MOSFET
- e. Calculate the necessary Cv rating for a liquid service valve, given a pressure drop of 24 PSID, a specific gravity of 1.3, and a maximum flow rate of 140 GPM. Assume there will be no flashing or choked flow through the valve. 2 1
- (i) 0.1319 (ii) 32.58
- (iii) 7.583 (iv) 2585
- f. In P-D controller, the derivative action plays a significant role in increasing \_\_\_\_\_ of response. 2 1
- (i) Time (ii) Distance
- (iii) Speed (iv) Volume
- g. The derivative control action is typically used when controlling \_\_\_\_\_, but rarely used when controlling \_\_\_\_\_. 3 1
- (i) Temperature, Flow (ii) Flow, Level
- (iii) pH, Temperature (iv) Level, Temperature
- h. If an error signal  $e(t)$  of an ON-OFF controller is found to be greater than zero, what would be its output? 3 1
- (i) 10% (ii) 50%
- (iii) 80% (iv) 100%
- i. The range of control of controller \_\_\_\_\_ due to presence of offset. 3 1
- (i) increases (ii) decreases
- (iii) remains constant (iv) None of these
- j. The Boolean representation of this PLC program is: 2 2



(i)  $ABC + D$

(ii)  $C + (A + B)D$

(iii)  $C + D(A + B)$

(iv)  $C(AB + D)$

**PART – B: (Short Answer Questions)**

**(2 x 5 = 10 Marks)**

Q.2. Answer *ALL* questions

	[CO#]	[PO#]
a. Define black body radiation. Draw a neat diagram	1	1
b. State the classifications of control valves.	2	1
c. What do you mean by Silicon controlled rectifier(SCR)? Draw its characteristic curve.	2	1
d. Distinguish Continuous control and Discrete Control.	3	1
e. Draw a circuit diagram to implement ON/OFF controller	1	2

**PART – C: (Long Answer Questions)**

**(6 x 5 = 30 Marks)**

Answer *ANY FIVE* questions

	Marks	[CO#]	[PO#]
3. Describe the operation of a Bourdon Tube pressure gauge and bellows type pressure gauge.	(6)	1	1
4. A photovoltaic cell is to be used with radiation of intensity from 5 to 12 $\text{mW/cm}^2$ . Measurements show that its unloaded output voltage ranges from 0.22 to 0.41 V over this intensity while it delivers currents from 0.5 to 1.7 mA into a 100 $\Omega$ load. <ol style="list-style-type: none"> <li>Find the range of short circuit current.</li> <li>Develop signal conditioning to provide a linear voltage from 0.5 to 1.2 V as the intensity varies from 5 to 12 <math>\text{mW/cm}^2</math>.</li> </ol>	(6)	1	2
5. A TRIAC can be triggered from a.c line using a DIAC. Draw and explain a circuit diagram to illustrate the above operation.	(6)	2	1
6. When a Car enters the hall, a certain sequence is to be followed automatically. Steps are, 1) Soaping, 2) Washing, 3) Rinsing and 4) Drying. Implement this process sequence in PLC using Ladder Diagram programming language.	(6)	2	2
7. Draw a PLC ladder diagram to realize the following: <p>“When the garage door is opened, a light is switched on. After the garage door is closed, the light remains ON for 60 sec. Use ON timer to allow the driver to go inside the garage. Explain the function of each rung.</p>	(6)	3	2
8. Make a comparison between Proportional, Derivative and Integral control mode of a controller.	(6)	3	1
9. A magnetic amplifier requires a 5 to 10 V input signal from a 4 to 20 mA control signal. Design a signal conversion to provide this relationship.	(6)	2	2
10. Briefly describe LASER principle and its applications.	(6)	1	1

--- End of Paper ---